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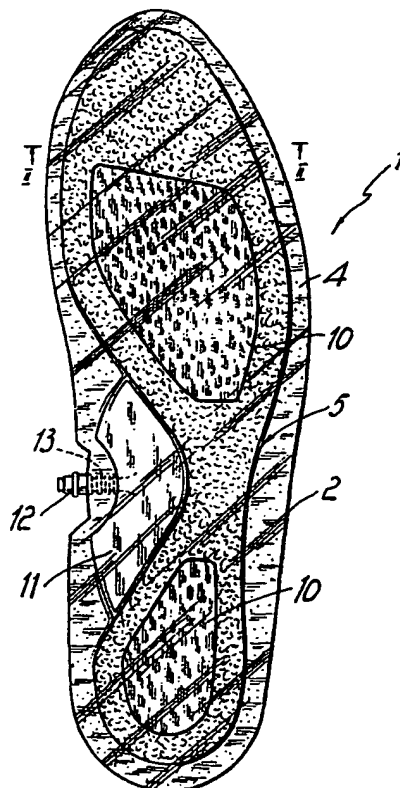
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## (57) Abstract

The insole includes at least first and second members, in a material impermeable to a fluid, and mutually tightly associated at their perimetric surface in order to define a cavity provided with means for a uniform and capillary distribution of the fluid inside the cavity. The distribution means occupies the entire cavity volume.



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## INSOLE

The present invention relates to an insole.

5 As known, in some types of shoes, especially those in which high comfort and technical performance are required, pneumatic insoles are often used for a better comfort in walking due to the better absorption of the ground unevenness by the insole.

10

Furthermore, these types of insole contain a fluid, such as for example, pressurized air, and are therefore better fitting the different anatomy of the user.

15 A normal inconvenience of these types of insoles is that the air tends to expand in a non uniform way inside the insole, for example moving into regions of the insole opposite to the regions where the foot exerts a pressure, and causing considerable annoyance.

20

In order to overcome this inconvenience, insoles have been provided with several dividing baffles in an attempt to better distribute the air inside the insole.

25 In this cases however, the air pressure forms protrusions between the baffles, where the material forming the insole resiliently yields.

30 It is also to be noted that, as the sole and/or upper wear out, those inconveniences increase and, if the sole is pierced, the whole shoe becomes useless.

The aim of the present invention is to eliminate the above described inconveniences of the prior art, providing an insole, with a high technical performance, which, beside providing the shoe with a high comfort, allows to vary the flexibility of the shoe according to the user's needs.

Within this aim, an important object of the invention is to provide a high technology insole adapted to perfectly distribute the fluid inside the insole and at the same time leaving the surface in contact with the foot substantially unaffected.

A further object of the invention is to provide an insole wherein the thickness can be varied in some sections, according to the user's needs.

Still a further object of the invention is to provide an insole that can be either removable or permanent in any type of shoe, and that in any case remains unaffected by the wear of the sole and/or upper.

The above aim and these and other objects are achieved by an insole characterized in that it comprises at least a first member and a second member, in a material impermeable to a fluid, said members being tightly associated at their perimetric surfaces in order to form at least one cavity between them, said cavity having distributing means for a uniform and capillary distribution of said fluid in said cavity, said distributing means occupying the entire volume of said cavity.

Further characteristics and advantages of the invention will be more apparent by the description of a preferred but not

exclusive embodiment of an insole with a high technical performance, according to the invention, illustrated, by way of indicative example in the enclosed drawings wherein:

5 Fig. 1 is a top plan view of the insole according to the invention;

Fig. 2 is a perspective exploded section view, according to the line II-II of figure 1, according to the invention;

10

Fig. 3 is a schematic exploded view of the insole according to the invention;

With reference to the figures, the insole according to the  
15 invention, generally designated by the reference numeral 1, comprises at least a first member and a second member, made of a material impermeable to a fluid, for example air, and respectively designated by numerals 2 and 3. The members 2 and 3 are mutually tightly associated along their perimetric  
20 surface 4.

Thanks to this solution, the first and second members 2, 3 form at least one cavity 20 between them. Distribution means 5, for a uniform and capillary distribution of the air  
25 inside the cavity 20, are arranged inside the same cavity 20.

Advantageously, the distribution means 5 is defined by an open cell material; a section of this material is shown in  
30 Fig. 2.

Conveniently, the open cell material, occupying the entire

cavity volume, has the same shape of the cavity and its upper and lower faces, respectively 6 and 7, are associated with the first and second member 2 and 3, respectively.

- 5 As shown in Figs. 1 and 3, the open cell material 5 may have one or more regions 10 having different density and/or different thickness.

10 For example, at the arch of the foot, the region 11 has a different density and/or thickness with respect of both the open cell material 5 and of the two regions 10 which both have the same density and/or thickness.

15 The open cell material may be a fabric, expanded plastics, or any other type of adapted material, and it is associated with the first and second impermeable members by known systems, such as gluing, welding, vulcanization, etc.

20 In the above described example, the insole is provided so that the air inside the cavity has a selected pressure according to the type of shoe.

In a preferred embodiment, the insole has instead a valve 12 for charging and discharging air inside the cavity.

25

Conveniently, in order not to create discomfort to the user, the valve 12 is arranged in a region of the cavity at the arch of the user's foot. A conduit 13 is connected to the valve 12 and has a free end substantially in contact with  
30 the open cell material 5.

It is easily understood how, by varying the air pressure

inside the cavity, it is possible to vary the flexibility of the first and second members without substantially varying the cavity volume and in particular the cavity thickness.

5 Furthermore, since the regions 10 and 11, having different thickness and density, have their edges perfectly matching the edges of the remaining part of the material 5, and since the conduit 13 is in contact with the open cell material, the fluid is prevented from forming pockets and therefore  
10 from forming annoying protrusions on the surface of the insole.

The insole also has a supplemental member 14 for covering the first and/or second impermeable members 2 and 3,  
15 ensuring a perfect comfort and transpiration of the foot.

The insole thus conceived may be removably arranged as an anatomical arch support in any type of shoe, or it can be provided, during assembly of the shoe, as a fixed and  
20 permanent part.

In both cases the insole according to the invention will not suffer from wear of the sole or upper and will be easily replaced if damaged.

25 The use of the insole according to the invention is evident from what has been described and illustrated above.

Namely, by introducing a variable quantity of fluid into the  
30 cavity, the fluid pressure inside the cavity is modified for varying the flexibility of the insole, according to the user's needs.

Furthermore, the variable fluid pressure inside the cavity defines a pneumatic suspension which can be modified according to the user's weight or to his/her requirements.

5

Furthermore, the insole will always have a mechanical suspension of the user's foot, formed by the open cell material inside the insole.

10 The open cell material being tightly associated with the surfaces of the first and second members 2 and 3, also allows a perfect distribution of the fluid inside the cavity.

15 As described above, the planarity of the insole can be modified by varying the density and/or the thickness of the open cell material and by varying the pressure of the fluid inside the cavity.

20 The materials employed, as well as the dimensions, may be any according to the specific needs and the state of the art.

25

30



## CLAIMS

1. Insole characterized in that it comprises at least a first member and a second member, in a material impermeable to a fluid, said members being tightly associated at their perimetric surfaces in order to form at least one cavity between them, said cavity having distributing means for a uniform and capillary distribution of said fluid in said cavity, said distributing means occupying the entire volume of said cavity.
- 10 2. Insole, according to claim 1, characterized in that it comprises at least one charge and discharge valve for said fluid inside said cavity.
3. Insole, according to claim 1, characterized in that said distribution means are adapted to vary the flexibility of said first and second members according to the fluid pressure inside said cavity, without substantially modifying the cavity volume.
- 15 4. Insole, according to claim 1, characterized in that said distribution means comprises an open cell material having substantially the same shape of said cavity.
- 20 5. Insole, according to claim 4, characterized in that the entire surface of said open cell material is associated with at least one of said first and second members.
6. Insole, according to claim 4, characterized in that said open cell material occupies the entire volume of said cavity and has its upper and lower faces associated with said first and second members respectively.
- 25 7. Insole, according to claim 4, characterized in that said open cell material has at least one region with different density and/or thickness.
- 30 8. Insole, according to claim 2, characterized in that said valve is arranged in a region of said cavity at the arch of

the foot of the user.

9. Insole, according to claim 2, characterized in that said valve is connected to a conduit having a free end in contact with said open cell material.

5 10. Insole, according to claim 7, characterized in that said at least one region with different density and/or thickness has edges perfectly matching with the remaining portion of said material.

10 11. Insole, according to claim 1, characterized in that it comprises at least one supplemental member for covering said first and/or said second impermeable members for a perfect comfort and transpiration of said foot.

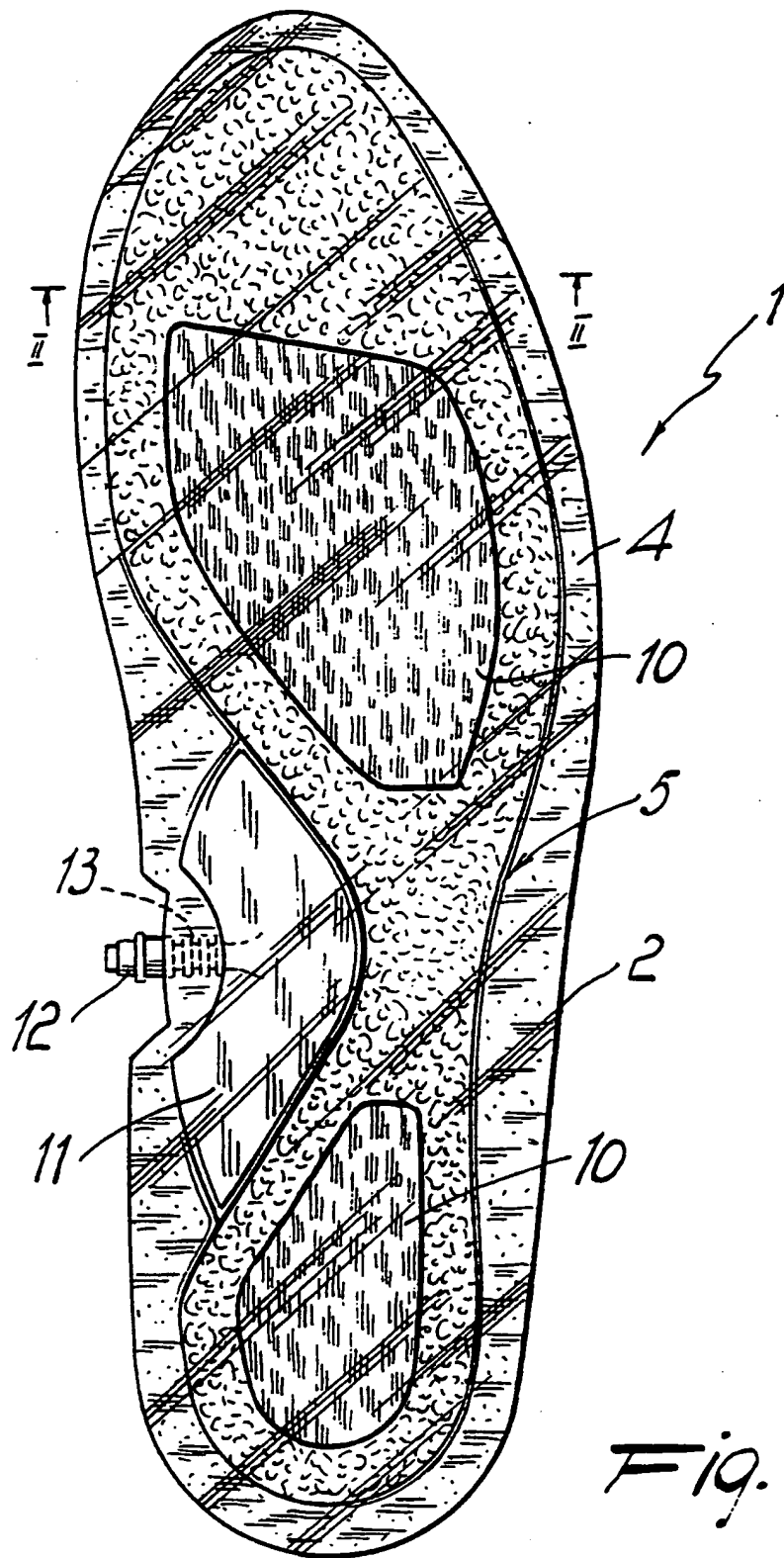
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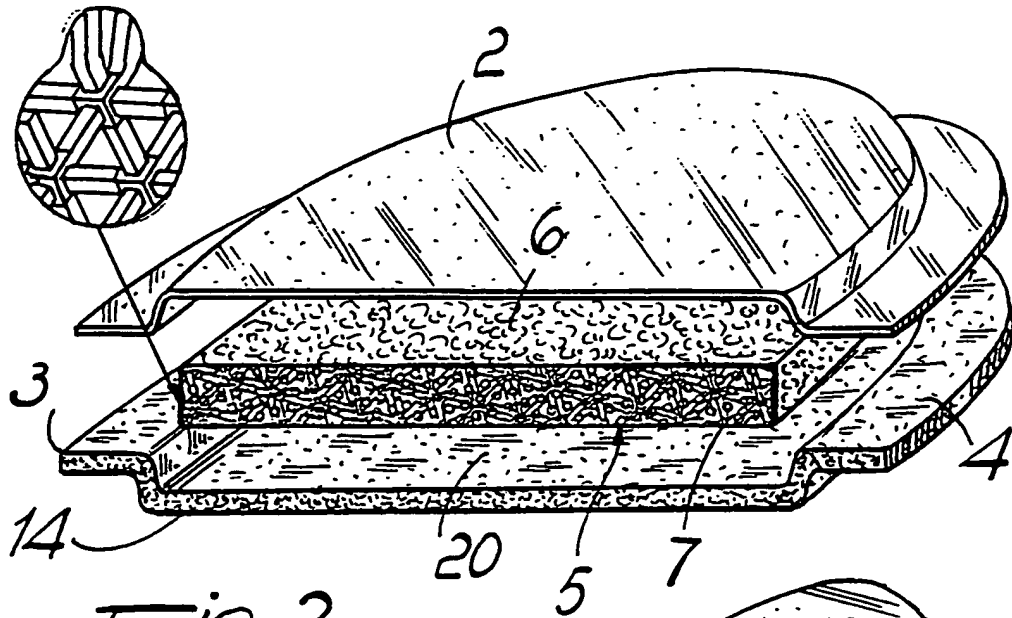


Fig. 2

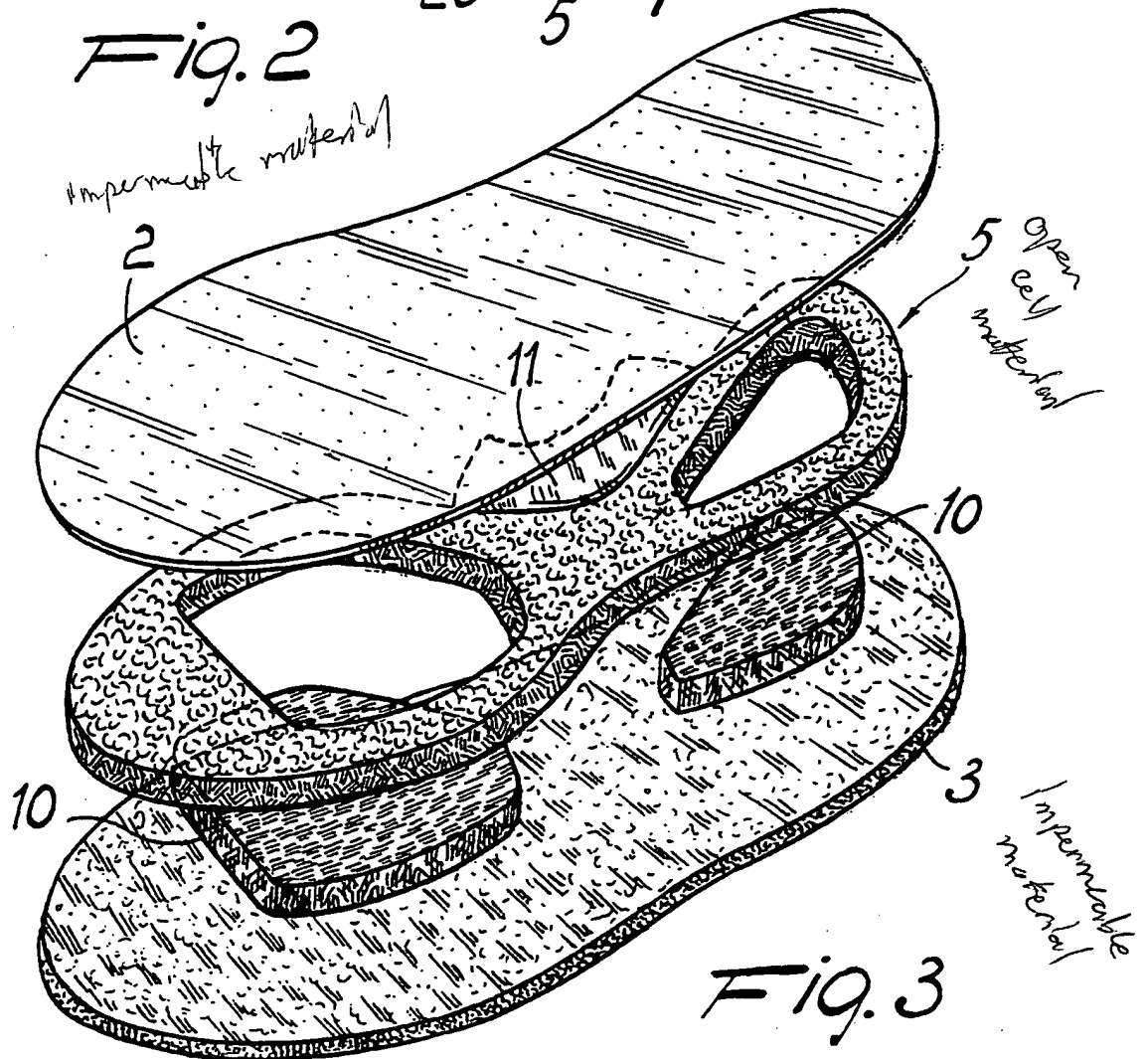


Fig. 3

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 94/01935

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 5 A43B17/03

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	CH,A,382 596 (E. LUNKENHEIMER) 15 December 1964 see the whole document ----	1-9
X	US,A,1 596 923 (C. COONEY) 24 August 1926 see the whole document ----	1-3
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Date of the actual completion of the international search

15 November 1994

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A	EP,A,0 336 801 (J. MAUGER) 11 October 1989 see the whole document -----	1

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Information on patent family members

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